## REMARKS/ARGUMENTS

This response is being filed in reply to the Final Office Action mailed February 23, 2009, in which claims 22-24, 26-32 and 34-46 were rejected. Claims 25 and 33 have been canceled. Claims 22, 30, 34, 40, and 43 have been amended. Claim 34 has been amended to properly depend from claim 30 instead of canceled claim 33. Claim 22 has been amended to recite in part "wherein the wall flow filter has at least one through hole cell formed therein running the longitudinal length of the wall flow filter," which is fully supported by the application as originally filed at, for example, page 3, lines 2-4; page 4, lines 4-6; page 6, lines 11-14; page 7, lines 3-5; page 13, original claim 27; and an illustrative embodiment shown in Figure 3. Claim 22 has also been amended to recite in part "wherein the catalyzed foam filter and wall flow filter are constructed and arranged so that exhaust first flows through the catalyzed foam filter and then flows through the wall flow filter," which is fully supported by the application as originally filed at, for example, page 3, line 24 to page 4, line 6; and page 7, lines 10-14.

Claim 30 has been amended to recite in part "wherein each wall flow filter has at least one through hole cell formed therein running the longitudinal length of the wall flow filter," which is fully supported by the application as originally filed at, for example, page 3, lines 2-4; page 4, lines 4-6; page 6, lines 11-14; page 7, lines 3-5; and an illustrative embodiment shown in Figure 4. Claim 30 has also been amended to recite in part "wherein each filter combination is constructed and arranged so the exhaust first flows through the catalyzed foam filter and then flows through the wall flow filter," which is fully supported by the application as originally filed at, for example, page 3, line 24 to page 4, line 6; page 4, lines 14-19; and page 7, lines 10-14.

Claim 40 has been amended to recite in part "wherein the wall flow filter has at least one through hole cell formed therein running the longitudinal length of the wall flow filter," which is fully supported by the application as originally filed at, for example, page 3, lines 2-4; page 4, lines 4-6; page 6, lines 11-14; page 7, lines 3-5; and an illustrative embodiment shown in Figure 3. Claim 40 has also been amended to recite in part "wherein the combination is constructed and arranged so that the exhaust first flows through the catalyzed foam filter and then flows through

the wall flow filter," which is fully supported by the application as originally filed at, for example, page 3, line 24 to page 4, line 6; and page 7, lines 10-14.

Claim 43 has been amended to recite in part "wherein each wall flow filter has at least one through hole cell formed therein running the longitudinal length of the wall flow filter," which is fully supported by the application as originally filed at, for example, page 3, lines 2-4; page 4, lines 4-6; page 6, lines 11-14; page 7, lines 3-5; and an illustrative embodiment shown in Figure 4. Claim 43 has also been amended to recite in part "wherein the catalyzed foam filter and wall flow filter are constructed and arranged so diesel engine exhaust gas first flows through the catalyzed foam filter and then flows through the wall flow filter," which is fully supported by the application as originally filed at, for example, page 4, lines 9-19; and page 7, lines 10-14.

It is believed that all currently pending claims are now allowable.

**Claim Rejections - 35 U.S.C. §103(a)**

**Claims 22, 23, 26, 27, 29-31, 34-36, 45 and 46**

Claims 22, 23, 26, 27, 29-31, 34-36, 45 and 46 were rejected under 35 USC §103(a) as being unpatentable over Ernest et al (U.S. 4,426,320) in view of Wang (U.S. 5,707,593). The Office Action has failed to establish a prima facie case of obviousness with respect to claims 22, 23, 26, 27, 29-31, 34-36, 45 and 46. Neither Ernest nor Wang teach or suggest "wherein the wall flow filter has at least one through hole cell formed therein running the longitudinal length of the wall flow filter," as recited in part in amended independent claim 22. Rather, Ernest discloses a fine filter, where "open cell filter structure having a plurality of interconnected voids is especially preferred. The continuous cells of such a structure provide convoluted gas flow paths so that there is a greater probability that a particle will be trapped and not pass through the filter." *Ernest col. 2, lines 13-18.* Furthermore, Ernest states that an "especially preferred filter having a continuous cellular structure is a ceramic foam" and the "ceramic foam filter preferably used in the present invention is prepared from an open cell, flexible foam material having a plurality of interconnected voids surrounded by a web of the flexible foam material, such as a polyurethane foam or cellulosic foam." *Ernest col. 2, lines 21-22 and lines 32-36.* Wang discloses a porous heat-retaining zone 4 which "may be constructed of reticulated foam cells of ceramic materials." *Wang col. 4, lines 12-15.* One of the functions of the porous heat-retaining

zone 4 is "for prolonging the retention time of exhaust in the reactor." *Wang col. 4, lines 27-28.* There is no suggestion in Ernest or Wang of a "wall flow filter ha[ving] at least one through hole cell formed therein running the longitudinal length of the wall flow filter."

The Office Action acknowledges that Ernest fails to teach "wherein the wall flow filter surrounds at least a portion of the side edge to trap particulate matter between the wall flow filter and the catalyzed foam filter," as recited in part in claim 22. But Wang does not make up for the deficiencies of Ernest. First, the porous heat-retaining zone 4 of Wang is not a wall flow filter having "at least one through hole cell formed therein running the longitudinal length of the wall flow filter," as discussed above. Second, the ceramic foam cells 30 of Wang is not a "catalyzed foam filter." The only embodiments of Wang that include a catalyst are that shown in Figure 2, which includes "a catalytic oxidizer layer 200" that is located "outside the reaction zone" (*Wang col. 6, lines 45-46, and col. 7, lines 21-22*), and that shown in Figure 3, which includes "a catalytic converter 300" that is "located upstream from the outlet pipe 11" (*Wang col. 6, lines 55-57*). The ceramic foam cells 30 are not catalyzed but are part of a reactor where "[b]y means of impinging heat transfer, thermal radiation enhancement, energy trapping and combustion of engine emissions, temperatures sufficient to oxidize carbon soot particles, carbon monoxide, and unburned hydrocarbons are attained." *Wang, Abstract.* Third, Wang does not disclose or suggest "wherein the catalyzed foam filter and wall flow filter are constructed and arranged so that exhaust first flows through the catalyzed foam filter and then flows through the wall flow filter," as recited in part in amended claim 22. As shown in Figure 1 of Wang, for example, the engine exhaust could easily first flow through the porous heat-retaining zone 4 before reaching the ceramic foam cells 30 since the engine exhaust gas enters the reaction zone 20 through inlet pipe 9. Wang explains that "[s]ome of the incoming flow directly passes into the niche 35 where it mixes with the distributed flow there and then passes through the porous heat-retaining zone 4." *Wang col. 4, lines 58-60.*

Claims 23, 26, 27, 29, 35, 36, and 45 depend from claim 22 and are patentable on the same basis. Moreover, Ernest does not teach or suggest "wherein the wall flow filter is a single cell wall flow filter," as recited in part in dependent claim 27. The Office states with respect to claim 27 that Ernest teaches that the cell sizes of each filter are selected to optimize particulate trapping and it would have been obvious to optimize the cell size of the filter. But as described

above, the fine filter of Ernest is preferably an "open cell filter structure having a plurality of interconnected voids" where the "continuous cells of such a structure provide convoluted gas flow paths so that there is a greater probability that a particle will be trapped and not pass through the filter." *Ernest col. 2, lines 13-18.* Ernest states that the "fine filter has a greater number of cells per unit length and a smaller cell size than the coarse filter," the "fine filter generally has a pore size of from about 15 to about 50 pores per 25 millimeters in length," and "[p]referably, . . . the fine filter has from about 17 to about 30 pores per 25 millimeters in length." *Ernest col. 3, lines 10-30.* Thus, Ernest does not suggest that the fine filter is a single cell wall flow filter.

Neither Ernest nor Wang teach or suggest "a plurality of filter combinations, and wherein each filter combination includes a catalyzed foam filter and wall flow filter," as recited in part in independent claim 30. The Office Action acknowledges that "Ernest fail to teach a plurality of filters." *Office Action 2-23-09, page 14.* And neither Ernest nor Wang teach "wherein each wall flow filter has at least one through hole cell formed therein running the longitudinal length of the wall flow filter," as recited in part in amended independent claim 30. Rather, Ernest discloses a fine filter, where "open cell filter structure having a plurality of interconnected voids is especially preferred. The continuous cells of such a structure provide convoluted gas flow paths so that there is a greater probability that a particle will be trapped and not pass through the filter." *Ernest col. 2, lines 13-18.* Furthermore, Ernest states that an "especially preferred filter having a continuous cellular structure is a ceramic foam" and the "ceramic foam filter preferably used in the present invention is prepared from an open cell, flexible foam material having a plurality of interconnected voids surrounded by a web of the flexible foam material, such as a polyurethane foam or cellulosic foam." *Ernest col. 2, lines 21-22 and lines 32-36.* Wang discloses a porous heat-retaining zone 4 which "may be constructed of reticulated foam cells of ceramic materials." *Wang col. 4, lines 12-15.* One of the functions of the porous heat-retaining zone 4 is "for prolonging the retention time of exhaust in the reactor." *Wang col. 4, lines 27-28.* There is no suggestion in Ernest or Wang of a "wall flow filter ha[ving] at least one through hole cell formed therein running the longitudinal length of the wall flow filter."

The Office Action acknowledges that Ernest fails to teach "wherein one of the wall flow filters surrounds at least a portion of the side edge to trap particulate matter between the wall flow filter and the catalyzed foam filter," as recited in part in claim 30. But Wang does not make up for the deficiencies of Ernest. First, the porous heat-retaining zone 4 of Wang is not a wall flow filter having "at least one through hole cell formed therein running the longitudinal length of the wall flow filter," as discussed above. Second, the ceramic foam cells 30 of Wang is not a "catalyzed foam filter." The only embodiments of Wang that include a catalyst are that shown in Figure 2, which includes "a catalytic oxidizer layer 200" that is located "outside the reaction zone" (*Wang col. 6, lines 45-46, and col. 7, lines 21-22*), and that shown in Figure 3, which includes "a catalytic converter 300" that is "located upstream from the outlet pipe 11" (*Wang col. 6, lines 55-57*). The ceramic foam cells 30 are not catalyzed but are part of a reactor where "[b]y means of impinging heat transfer, thermal radiation enhancement, energy trapping and combustion of engine emissions, temperatures sufficient to oxidize carbon soot particles, carbon monoxide, and unburned hydrocarbons are attained." *Wang, Abstract.* Third, Wang does not disclose or suggest "wherein each filter combination is constructed and arranged so the exhaust first flows through the catalyzed foam filter and then flows through the wall flow filter," as recited in part in amended claim 30. As shown in Figure 1 of Wang, for example, the engine exhaust could easily first flow through the porous heat-retaining zone 4 before reaching the ceramic foam cells 30 since the engine exhaust gas enters the reaction zone 20 through inlet pipe 9. Wang explains that "[s]ome of the incoming flow directly passes into the niche 35 where it mixes with the distributed flow there and then passes through the porous heat-retaining zone 4." *Wang col. 4, lines 58-60.*

Claims 31, 34, and 46 depend from claim 30 and are patentable on the same basis. Withdrawal of the rejection is respectfully requested.

**Claims 22, 23, 26, 29-31, 34-36, 45, and 46**

Claims 22, 23, 26, 29-31, 34-36, 45, and 46 were rejected under 35 USC §103(a) as being unpatentable over Rummler et al (U.S. 5,853,579) in view of Wang (U.S. 5,707,593). The Office Action has failed to establish a prima facie case of obviousness with respect to claims 22, 23, 26, 29-31, 34-36, 45, and 46. Rummler does not teach or suggest "wherein the catalyzed

foam filter and wall flow filter are constructed and arranged so that exhaust first flows through the catalyzed foam filter and then flows through the wall flow filter," as recited in part in amended claim 22 (emphasis added). Rummler is directed to a treatment system for treating solid and/or liquid materials. The Office Action points to Figure 24A of Rummler, which includes a two stage filter assembly for filtering liquids (*Rummler col. 30, lines 66-67*) subject to microwave energy from a microwave source, in which "liquids exit[] the liquid treatment filters" (*Rummler col. 31, line* 58).

Neither Rummler nor Wang teach or suggest "wherein the wall flow filter has at least one through hole cell formed therein running the longitudinal length of the wall flow filter," as recited in part in amended independent claim 22. Rummler discloses conical porous ceramic filter elements 552, 554, where the upper filter 552 is a coarse filter having a pore size of 100-500 microns, and the lower filter 554 is a fine filter having a pore size of 10-50 microns. *Rummer col. 31, lines 11-22.* Thus, there is no suggestion that the fine filter "has at least one through hole formed therein running the longitudinal length of the wall flow filter." Wang discloses a porous heat-retaining zone 4 which "may be constructed of reticulated foam cells of ceramic materials." *Wang col. 4, lines 12-15.* One of the functions of the porous heat-retaining zone 4 is "for prolonging the retention time of exhaust in the reactor." *Wang col. 4, lines 27-28.* There is no suggestion in Wang of a "wall flow filter ha[ving] at least one through hole cell formed therein running the longitudinal length of the wall flow filter."

The Office Action acknowledges that Rummler fails to teach "wherein the wall flow filter surrounds at least a portion of the side edge to trap particulate matter between the wall flow filter and the catalyzed foam filter," as recited in part in claim 22. But Wang does not make up for the deficiencies of Rummler. First, the porous heat-retaining zone 4 of Wang is not a wall flow filter having "at least one through hole cell formed therein running the longitudinal length of the wall flow filter," as discussed above. Second, the ceramic foam cells 30 of Wang is not a "catalyzed foam filter." The only embodiments of Wang that include a catalyst are that shown in Figure 2, which includes "a catalytic oxidizer layer 200" that is located "outside the reaction zone" (*Wang col. 6, lines 45-46, and col. 7, lines 21-22*), and that shown in Figure 3, which includes "a catalytic converter 300" that is "located upstream from the outlet pipe 11" (*Wang col. 6, lines 55-57*). The ceramic foam cells 30 are not catalyzed but are part of a reactor where "[b]y

means of impinging heat transfer, thermal radiation enhancement, energy trapping and combustion of engine emissions, temperatures sufficient to oxidize carbon soot particles, carbon monoxide, and unburned hydrocarbons are attained." *Wang, Abstract.* Third, Wang does not disclose or suggest "wherein the catalyzed foam filter and wall flow filter are constructed and arranged so that exhaust first flows through the catalyzed foam filter and then flows through the wall flow filter," as recited in part in amended claim 22. As shown in Figure 1 of Wang, for example, the engine exhaust could easily first flow through the porous heat-retaining zone 4 before reaching the ceramic foam cells 30 since the engine exhaust gas enters the reaction zone 20 through inlet pipe 9. Wang explains that "[s]ome of the incoming flow directly passes into the niche 35 where it mixes with the distributed flow there and then passes through the porous heat-retaining zone 4." *Wang col. 4, lines 58-60.*

Claims 23, 26, 29, 35, 36, and 45 depend from claim 22 and are patentable on the same basis.

Neither Rummler nor Wang teach or suggest "a plurality of filter combinations, and wherein each filter combination includes a catalyzed foam filter and wall flow filter," as recited in part in independent claim 30. The Office Action acknowledges that "Rummler fail to teach a plurality of filters." *Office Action 2-23-09, page 12.* Wang discloses a reactor having a porous heat-retaining zone 4 and porous ceramic foam cells 30, not a plurality of filter combinations. And neither Rummler nor Wang teach "wherein each wall flow filter has at least one through hole cell formed therein running the longitudinal length of the wall flow filter," as recited in part in amended independent claim 30. Rummler discloses conical porous ceramic filter elements 552, 554, where the upper filter 552 is a coarse filter having a pore size of 100-500 microns, and the lower filter 554 is a fine filter having a pore size of 10-50 microns. *Rummer col. 31, lines 11-22.* Thus, there is no suggestion that the fine filter "has at least one through hole formed therein running the longitudinal length of the wall flow filter." Wang discloses a porous heat-retaining zone 4 which "may be constructed of reticulated foam cells of ceramic materials." *Wang col. 4, lines 12-15.* One of the functions of the porous heat-retaining zone 4 is "for prolonging the retention time of exhaust in the reactor." *Wang col. 4, lines 27-28.* There is no suggestion in Wang of a "wall flow filter ha[ving] at least one through hole cell formed therein running the longitudinal length of the wall flow filter."

The Office Action acknowledges that Rummler fails to teach "wherein one of the wall flow filters surrounds at least a portion of the side edge to trap particulate matter between the wall flow filter and the catalyzed foam filter," as recited in part in claim 30. But Wang does not make up for the deficiencies of Rummler. First, the porous heat-retaining zone 4 of Wang is not a wall flow filter having "at least one through hole cell formed therein running the longitudinal length of the wall flow filter," as discussed above. Second, the ceramic foam cells 30 of Wang is not a "catalyzed foam filter." The only embodiments of Wang that include a catalyst are that shown in Figure 2, which includes "a catalytic oxidizer layer 200" that is located "outside the reaction zone" (*Wang col. 6, lines 45-46, and col. 7, lines 21-22*), and that shown in Figure 3, which includes "a catalytic converter 300" that is "located upstream from the outlet pipe 11" (*Wang col. 6, lines 55-57*). The ceramic foam cells 30 are not catalyzed but are part of a reactor where "[b]y means of impinging heat transfer, thermal radiation enhancement, energy trapping and combustion of engine emissions, temperatures sufficient to oxidize carbon soot particles, carbon monoxide, and unburned hydrocarbons are attained." *Wang, Abstract.* Third, Wang does not disclose or suggest "wherein each filter combination is constructed and arranged so the exhaust first flows through the catalyzed foam filter and then flows through the wall flow filter," as recited in part in amended claim 30. As shown in Figure 1 of Wang, for example, the engine exhaust could easily first flow through the porous heat-retaining zone 4 before reaching the ceramic foam cells 30 since the engine exhaust gas enters the reaction zone 20 through inlet pipe 9. Wang explains that "[s]ome of the incoming flow directly passes into the niche 35 where it mixes with the distributed flow there and then passes through the porous heat-retaining zone 4." *Wang col. 4, lines 58-60.*

Claims 31, 34, and 46 depend from claim 30 and are patentable on the same basis. Withdrawal of the rejection is respectfully requested.

**Claims 24, 28, 32, and 37-44**

Claims 24, 28, 32, and 37-44 were rejected under 35 USC §103(a) as being unpatentable over Ernest et al (U.S. 4,426,320) in view of Wang (U.S. 5,707,593) and Galloway (U.S. 5,582,800). Claims 24, 28, and 37-39 depend from claim 22 and are patentable on the

same basis. Claim 32 depends from claim 30 and is patentable on the same basis. The addition of Galloway does not overcome the deficiencies of Ernest and Wang.

Neither Ernest nor Wang teach or suggest "wherein the wall flow filter has at least one through hole cell formed therein running the longitudinal length of the wall flow filter," as recited in part in amended independent claim 40. Rather, Ernest discloses a fine filter, where "open cell filter structure having a plurality of interconnected voids is especially preferred. The continuous cells of such a structure provide convoluted gas flow paths so that there is a greater probability that a particle will be trapped and not pass through the filter." *Ernest col. 2, lines 13-18.* Furthermore, Ernest states that an "especially preferred filter having a continuous cellular structure is a ceramic foam" and the "ceramic foam filter preferably used in the present invention is prepared from an open cell, flexible foam material having a plurality of interconnected voids surrounded by a web of the flexible foam material, such as a polyurethane foam or cellulosic foam." *Ernest col. 2, lines 21-22 and lines 32-36.* Wang discloses a porous heat-retaining zone 4 which "may be constructed of reticulated foam cells of ceramic materials." *Wang col. 4, lines 12-15.* One of the functions of the porous heat-retaining zone 4 is "for prolonging the retention time of exhaust in the reactor." *Wang col. 4, lines 27-28.* There is no suggestion in Ernest or Wang of a "wall flow filter ha[ving] at least one through hole cell formed therein running the longitudinal length of the wall flow filter."

The Office Action acknowledges that Ernest fails to teach "wherein the wall flow filter surrounds at least a portion of the side edge, and so that a space is provided between the wall flow filter and the side edge sufficient to trap particulate matter in the space," as recited in part in claim 40. But Wang does not make up for the deficiencies of Ernest. First, the porous heat-retaining zone 4 of Wang is not a wall flow filter having "at least one through hole cell formed therein running the longitudinal length of the wall flow filter," as discussed above. Second, the ceramic foam cells 30 of Wang is not a "catalyzed foam filter." The only embodiments of Wang that include a catalyst are that shown in Figure 2, which includes "a catalytic oxidizer layer 200" that is located "outside the reaction zone" (*Wang col. 6, lines 45-46, and col. 7, lines 21-22*), and that shown in Figure 3, which includes "a catalytic converter 300" that is "located upstream from the outlet pipe 11" (*Wang col. 6, lines 55-57*). The ceramic foam cells 30 are not catalyzed but are part of a reactor where "[b]y means of impinging heat transfer,

thermal radiation enhancement, energy trapping and combustion of engine emissions, temperatures sufficient to oxidize carbon soot particles, carbon monoxide, and unburned hydrocarbons are attained." *Wang, Abstract.* Third, Wang does not disclose or suggest "wherein the combination is constructed and arranged so that exhaust first flows through the catalyzed foam filter and then flows through the wall flow filter," as recited in part in amended claim 40. As shown in Figure 1 of Wang, for example, the engine exhaust could easily first flow through the porous heat-retaining zone 4 before reaching the ceramic foam cells 30 since the engine exhaust gas enters the reaction zone 20 through inlet pipe 9. Wang explains that "[s]ome of the incoming flow directly passes into the niche 35 where it mixes with the distributed flow there and then passes through the porous heat-retaining zone 4." *Wang col. 4, lines 58-60.*

Claims 41 depends from claim 40 and is patentable on the same basis. Moreover, the Office Action acknowledges that Ernest fails to teach a separator as recited in part in claim 41. But Galloway does not teach or suggest "a separator connected to the inner surface and the separator having an opening therethrough, and wherein the combination is supported by the separator so that the opening exposes only the front face of the catalyzed foam filter," as recited in part in claim 41 (emphasis added). Galloway is directed to a method and apparatus of for the destruction of organic hazardous waste containing toxic components, not an engine exhaust filter system. The vessel 10 of Galloway includes filters 14, where each filter 14 comprising tube 16 attached to top plate 13. *Galloway col. 5, lines 19-23.* Tube 16 has a coarse mesh on inside surface 19 and a fine mesh on outer surface 18. *Galloway col. 5, lines 26-28.* As shown by Figures 3 and the description, the top plate 13 does not have an opening that "exposes only the front face of the catalyzed foam filter," where the coarse filter is equated to the catalyzed foam filter. Rather, the openings in the top plate 13 are arranged for lines 39 and 43 to extend through the top plate 13 into the vessel 10. Claim 42 depends from claim 41 and is patentable on the same basis.

Neither Ernest nor Wang teach or suggest "a plurality of filter combinations" as recited in part in amended independent claim 43. The Office Action acknowledges that "Ernest fail to teach a plurality of filters." *Office Action 2-23-09, page 14.*

Neither Ernest nor Wang teach or suggest "wherein each wall flow filter has at least one through hole cell formed therein running the longitudinal length of the wall flow filter," as

recited in part in amended independent claim 43. Rather, Ernest discloses a fine filter, where "open cell filter structure having a plurality of interconnected voids is especially preferred. The continuous cells of such a structure provide convoluted gas flow paths so that there is a greater probability that a particle will be trapped and not pass through the filter." *Ernest col. 2, lines 13-18.* Furthermore, Ernest states that an "especially preferred filter having a continuous cellular structure is a ceramic foam" and the "ceramic foam filter preferably used in the present invention is prepared from an open cell, flexible foam material having a plurality of interconnected voids surrounded by a web of the flexible foam material, such as a polyurethane foam or cellulosic foam." *Ernest col. 2, lines 21-22 and lines 32-36.* Wang discloses a porous heat-retaining zone 4 which "may be constructed of reticulated foam cells of ceramic materials." *Wang col. 4, lines 12-15.* One of the functions of the porous heat-retaining zone 4 is "for prolonging the retention time of exhaust in the reactor." *Wang col. 4, lines 27-28.* There is no suggestion in Ernest or Wang of a "wall flow filter ha[ving] at least one through hole cell formed therein running the longitudinal length of the wall flow filter."

The Office Action acknowledges that Ernest fails to teach "wherein one of the wall flow filters surrounds at least a portion of the side edge," as recited in part in claim 43. But Wang does not make up for the deficiencies of Ernest. First, the porous heat-retaining zone 4 of Wang is not a wall flow filter having "at least one through hole cell formed therein running the longitudinal length of the wall flow filter," as discussed above. Second, the ceramic foam cells 30 of Wang is not a "catalyzed foam filter." The only embodiments of Wang that include a catalyst are that shown in Figure 2, which includes "a catalytic oxidizer layer 200" that is located "outside the reaction zone" (*Wang col. 6, lines 45-46, and col. 7, lines 21-22*), and that shown in Figure 3, which includes "a catalytic converter 300" that is "located upstream from the outlet pipe 11" (*Wang col. 6, lines 55-57*). The ceramic foam cells 30 are not catalyzed but are part of a reactor where "[b]y means of impinging heat transfer, thermal radiation enhancement, energy trapping and combustion of engine emissions, temperatures sufficient to oxidize carbon soot particles, carbon monoxide, and unburned hydrocarbons are attained." *Wang, Abstract.* Third, Wang does not disclose or suggest "wherein the catalyzed foam filter and wall flow filter are constructed and arranged so diesel engine exhaust gas first flows through the catalyzed foam filter and then flows through the wall flow filter," as recited in part in amended claim 43. As

shown in Figure 1 of Wang, for example, the engine exhaust could easily first flow through the porous heat-retaining zone 4 before reaching the ceramic foam cells 30 since the engine exhaust gas enters the reaction zone 20 through inlet pipe 9. Wang explains that "[s]ome of the incoming flow directly passes into the niche 35 where it mixes with the distributed flow there and then passes through the porous heat-retaining zone 4." *Wang col. 4, lines 58-60.*

The Office Action also acknowledges that Ernest fails to teach a separator as recited in part in claim 43. But Galloway does not teach or suggest "a separator connected to the inner surface and the separator having a plurality of openings therethrough, wherein each opening is constructed and arranged to expose only the front face of one of the catalyzed foam filters," as recited in part in claim 43 (emphasis added). Galloway is directed to a method and apparatus of for the destruction of organic hazardous waste containing toxic components, not an engine exhaust filter system. The vessel 10 of Galloway includes filters 14, where each filter 14 comprising tube 16 attached to top plate 13. *Galloway col. 5, lines 19-23.* Tube 16 has a coarse mesh on inside surface 19 and a fine mesh on outer surface 18. *Galloway col. 5, lines 26-28.* As shown by Figures 3 and the description, the top plate 13 does not have openings that "expose only the front face of one of the catalyzed foam filters," where the coarse filter is equated to the catalyzed foam filter. Rather, the openings in the top plate 13 are arranged for lines 39 and 43 to extend through the top plate 13 into the vessel 10.

Claim 44 depends from claim 43 and is patentable on the same basis. Withdrawal of the rejection is respectfully requested.

**Claims 24, 28, 32, and 37-44**

Claims 24, 28, 32, and 37-44 were rejected under 35 USC §103(a) as being unpatentable over either Rummler et al (U.S. 5,853,579) in view of Wang (U.S. 5,707,593) and Galloway (U.S. 5,582,800). Claims 24, 28, and 37-39 depend from claim 22 and are patentable on the same basis. Claim 32 depends from claim 30 and is patentable on the same basis. The addition of Galloway does not overcome the deficiencies of Rummler and Wang.

Rummer does not teach "an engine exhaust filter system" as recited in part independent claim 40. Rummler is directed to a treatment system for treating solid and/or liquid materials. The Office Action points to Figure 24A of Rummler, which includes a two stage filter

assembly for filtering liquids (*Rummler col. 30, lines 66-67*) subject to microwave energy from a microwave source, in which "liquids exit[] the liquid treatment filters" (*Rummler col. 31, line 58*).

Neither Rummler nor Wang teach or suggest "wherein the wall flow filter has at least one through hole cell formed therein running the longitudinal length of the wall flow filter," as recited in part in amended independent claim 40. Rummler discloses conical porous ceramic filter elements 552, 554, where the upper filter 552 is a coarse filter having a pore size of 100-500 microns, and the lower filter 554 is a fine filter having a pore size of 10-50 microns. *Rummer col. 31, lines 11-22.* Thus, there is no suggestion that the fine filter "has at least one through hole formed therein running the longitudinal length of the wall flow filter." Wang discloses a porous heat-retaining zone 4 which "may be constructed of reticulated foam cells of ceramic materials." *Wang col. 4, lines 12-15.* One of the functions of the porous heat-retaining zone 4 is "for prolonging the retention time of exhaust in the reactor." *Wang col. 4, lines 27-28.* There is no suggestion in Wang of a "wall flow filter ha[ving] at least one through hole cell formed therein running the longitudinal length of the wall flow filter."

The Office Action acknowledges that Rummler fails to teach "wherein the wall flow filter surrounds at least a portion of the side edge, and so that a space is provided between the wall flow filter and the side edge sufficient to trap particulate matter in the space," as recited in part in claim 40. But Wang does not make up for the deficiencies of Rummler. First, the porous heat-retaining zone 4 of Wang is not a wall flow filter having "at least one through hole cell formed therein running the longitudinal length of the wall flow filter," as discussed above. Second, the ceramic foam cells 30 of Wang is not a "catalyzed foam filter." The only embodiments of Wang that include a catalyst are that shown in Figure 2, which includes "a catalytic oxidizer layer 200" that is located "outside the reaction zone" (*Wang col. 6, lines 45-46, and col. 7, lines 21-22*), and that shown in Figure 3, which includes "a catalytic converter 300" that is "located upstream from the outlet pipe 11" (*Wang col. 6, lines 55-57*). The ceramic foam cells 30 are not catalyzed but are part of a reactor where "[b]y means of impinging heat transfer, thermal radiation enhancement, energy trapping and combustion of engine emissions, temperatures sufficient to oxidize carbon soot particles, carbon monoxide, and unburned hydrocarbons are attained." *Wang, Abstract.* Third, Wang does not disclose or suggest "wherein

the combination is constructed and arranged so that the exhaust first flows through the catalyzed foam filter and then flows through the wall flow filter," as recited in part in amended claim 40. As shown in Figure 1 of Wang, for example, the engine exhaust could easily first flow through the porous heat-retaining zone 4 before reaching the ceramic foam cells 30 since the engine exhaust gas enters the reaction zone 20 through inlet pipe 9. Wang explains that "[s]ome of the incoming flow directly passes into the niche 35 where it mixes with the distributed flow there and then passes through the porous heat-retaining zone 4." *Wang col. 4, lines 58-60.*

Claims 41 depends from claim 40 and is patentable on the same basis. Moreover, the Office Action acknowledges that Rummler fails to teach a separator as recited in part in claim 41. But Galloway does not teach or suggest "a separator connected to the inner surface and the separator having an opening therethrough, and wherein the combination is supported by the separator so that the opening exposes only the front face of the catalyzed foam filter," as recited in part in claim 41 (emphasis added). Galloway is directed to a method and apparatus of for the destruction of organic hazardous waste containing toxic components, not an engine exhaust filter system. The vessel 10 of Galloway includes filters 14, where each filter 14 comprising tube 16 attached to top plate 13. *Galloway col. 5, lines 19-23.* Tube 16 has a coarse mesh on inside surface 19 and a fine mesh on outer surface 18. *Galloway col. 5, lines 26-28.* As shown by Figures 3 and the description, the top plate 13 does not have an opening that "exposes only the front face of the catalyzed foam filter," where the coarse filter is equated to the catalyzed foam filter. Rather, the openings in the top plate 13 are arranged for lines 39 and 43 to extend through the top plate 13 into the vessel 10. Claim 42 depends from claim 41 and is patentable on the same basis.

Neither Rummler nor Wang teach or suggest "a plurality of filter combinations" as recited in part in amended independent claim 43. The Office Action acknowledges that "Rummler fail to teach a plurality of filters." *Office Action 2-23-09, page 12.*

Neither Rummler nor Wang teach or suggest "wherein each wall flow filter has at least one through hole cell formed therein running the longitudinal length of the wall flow filter," as recited in part in amended independent claim 43. Rummler discloses conical porous ceramic filter elements 552, 554, where the upper filter 552 is a coarse filter having a pore size of 100-500 microns, and the lower filter 554 is a fine filter having a pore size of 10-50 microns.

*Rummer col. 31, lines 11-22.* Thus, there is no suggestion that the fine filter "has at least one through hole formed therein running the longitudinal length of the wall flow filter." Wang discloses a porous heat-retaining zone 4 which "may be constructed of reticulated foam cells of ceramic materials." *Wang col. 4, lines 12-15.* One of the functions of the porous heat-retaining zone 4 is "for prolonging the retention time of exhaust in the reactor." *Wang col. 4, lines 27-28.* There is no suggestion in Ernest or Wang of a "wall flow filter ha[ving] at least one through hole cell formed therein running the longitudinal length of the wall flow filter."

The Office Action acknowledges that Rummler fails to teach "wherein one of the wall flow filters surrounds at least a portion of the side edge," as recited in part in claim 43. But Wang does not make up for the deficiencies of Rummler. First, the porous heat-retaining zone 4 of Wang is not a wall flow filter having "at least one through hole cell formed therein running the longitudinal length of the wall flow filter," as discussed above. Second, the ceramic foam cells 30 of Wang is not a "catalyzed foam filter." The only embodiments of Wang that include a catalyst are that shown in Figure 2, which includes "a catalytic oxidizer layer 200" that is located "outside the reaction zone" (*Wang col. 6, lines 45-46, and col. 7, lines 21-22*), and that shown in Figure 3, which includes "a catalytic converter 300" that is "located upstream from the outlet pipe 11" (*Wang col. 6, lines 55-57*). The ceramic foam cells 30 are not catalyzed but are part of a reactor where "[b]y means of impinging heat transfer, thermal radiation enhancement, energy trapping and combustion of engine emissions, temperatures sufficient to oxidize carbon soot particles, carbon monoxide, and unburned hydrocarbons are attained." *Wang, Abstract.* Third, Wang does not disclose or suggest "wherein the catalyzed foam filter and wall flow filter are constructed and arranged so diesel engine exhaust gas first flows through the catalyzed foam filter and then flows through the wall flow filter," as recited in part in amended claim 43. As shown in Figure 1 of Wang, for example, the engine exhaust could easily first flow through the porous heat-retaining zone 4 before reaching the ceramic foam cells 30 since the engine exhaust gas enters the reaction zone 20 through inlet pipe 9. Wang explains that "[s]ome of the incoming flow directly passes into the niche 35 where it mixes with the distributed flow there and then passes through the porous heat-retaining zone 4." *Wang col. 4, lines 58-60.*

The Office Action also acknowledges that Rummler fails to teach a separator as recited in part in claim 43. But Galloway does not teach or suggest "a separator connected to the

inner surface and the separator having a plurality of openings therethrough, wherein each opening is constructed and arranged to expose only the front face of one of the catalyzed foam filters," as recited in part in claim 43 (emphasis added). Galloway is directed to a method and apparatus of for the destruction of organic hazardous waste containing toxic components, not an engine exhaust filter system. The vessel 10 of Galloway includes filters 14, where each filter 14 comprising tube 16 attached to top plate 13. *Galloway col. 5, lines 19-23.* Tube 16 has a coarse mesh on inside surface 19 and a fine mesh on outer surface 18. *Galloway col. 5, lines 26-28.* As shown by Figures 3 and the description, the top plate 13 does not have openings that "expose only the front face of one of the catalyzed foam filters," where the coarse filter is equated to the catalyzed foam filter. Rather, the openings in the top plate 13 are arranged for lines 39 and 43 to extend through the top plate 13 into the vessel 10.

Claim 44 depends from claim 43 and is patentable on the same basis. Withdrawal of the rejection is respectfully requested.

**Claims 43 and 44**

Claims 43 and 44 were rejected under 35 USC §103(a) as being unpatentable over Rummler et al (U.S. 5,853,579) in view of Wang (U.S. 5,707,593) and Galloway (U.S. 5,582,800) and either one of Miller et al (U.S. 3,319,793) or Nagaoka (US 6,488,842). Independent claim 43 is patentable over Rummler, Wang, and Galloway, as described above. The addition of Miller or Nagaoka do not make up for the deficiencies of Rummler, Wang, and Galloway. Moreover, Miller, Nagaoka, or Galloway do not teach or suggest "a diesel engine exhaust filter system comprising a plurality of filter combinations, and wherein each filter combination comprises a catalyzed foam filter and a wall flow filter," as recited in part in independent claim 43. Miller is directed to a filer unit for fluids having filter elements consisting of a helically would cord 18 would about a rigid core 20 constructed of metal, plastic, or ceramics. Nagaoka is directed to a filtering device for liquid, including water for various uses, where the filters are annular multi-layered prepacked screen assemblies 7. And Galloway is directed to destroying organic hazardous waste containing toxic components using with filters 14, where each filter 14 comprises a tube 16 having a fine mesh and a course mesh. There is no

reason to combine Miller, Nagaoka, or Galloway with Rummler and Wang, nor do they suggest the claimed invention of claim 43.

Claim 44 depends from claim 43 and is patentable on the same basis. Withdrawal of the rejection is respectfully requested.

**Claims 43 and 44**

Claims 43 and 44 were rejected under 35 USC §103(a) as being unpatentable over Ernest et al (U.S. 4426320) in view of Wang (U.S. 5,707,593) and Galloway (U.S. 5,582,800) and either one of Miller et al (U.S. 3,319,793) or Nagaoka (US 6,488,842). Independent claim 43 is patentable over Ernest, Wang, and Galloway, as described above. The addition of Miller or Nagaoka do not make up for the deficiencies of Ernest, Wang, and Galloway. Moreover, Miller, Nagaoka, or Galloway do not teach or suggest "a diesel engine exhaust filter system comprising a plurality of filter combinations, and wherein each filter combination comprises a catalyzed foam filter and a wall flow filter," as recited in part in independent claim 43. Miller is directed to a filer unit for fluids having filter elements consisting of a helically would cord 18 would about a rigid core 20 constructed of metal, plastic, or ceramics. Nagaoka is directed to a filtering device for liquid, including water for various uses, where the filters are annular multi-layered prepacked screen assemblies 7. And Galloway is directed to destroying organic hazardous waste containing toxic components using with filters 14, where each filter 14 comprises a tube 16 having a fine mesh and a course mesh. There is no reason to combine Miller, Nagaoka, or Galloway with Ernest and Wang, nor do they suggest the claimed invention of claim 43.

Claim 44 depends from claim 43 and is patentable on the same basis. Withdrawal of the rejection is respectfully requested.

**CONCLUSION**

The Applicants respectfully request withdrawal of the all rejections raised in the Final Office Action mailed February 23, 2009. A Notice of Allowance for all pending claims is respectfully requested.

The Examiner is invited to telephone the Applicant's undersigned attorney at (248) 689-3500 if any unresolved matters remain in connection with this response.

The Commissioner is hereby authorized and respectfully requested to charge any fee necessary to timely file this paper including claim amendment, or credit any overpayments associated with this communication, to Deposit Account No. 07-0960.

Respectfully submitted,

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